CLAIMS

What is claimed is:

1.A method for calibrating a medical system capable of generating a magnetic field for tracking a position of a medical device, the method comprising the steps of:

(a) defining a mapping volume within the generated magnetic field;

(b) placing a metallic object within the mapping volume;

(c) aligning a sensor at a first point within the mapping volume and measuring the magnetic field at the first point with the sensor to establish a first coordinate position (X_i, Y_i, Z_i);

(d) moving the sensor to a next point (X_i + dx, Y_i + dy, Z_i + dz) along one coordinate axis by an added distance component (dx, dy, dz) and measuring the magnetic field at the next point to establish a next coordinate position;

(e) interpolating the magnetic field at an intermediate point between the first position and the next coordinate position to establish an interpolated intermediate coordinate position;

(f) determining the position difference between the interpolated intermediate coordinate position and an actual intermediate coordinate position;

(g) comparing the position difference to an error limit;

(h) setting (X_i, Y_i, Z_i) of the next point as ($X_i = X_i$ + dx, $Y_i = Y_i$ + dy, $Z_i = Z_i$ + dz) if the position difference is within the error limit and repeating steps (d) – (g) along another coordinate axis; and

(i) setting the added distance component (dx, dy, dz) by decreasing the value of the added distance component if the position difference is not within the error limit and repeating steps (d) – (g) along the same coordinate axis.

2. The method according to Claim 1, including completing the calibration method for the entire mapping volume.

3. The method according to Claim 2, wherein the error limit is $\leq$ 1 mm.

4. The method according to Claim 3, including moving the sensor a distance ranging from about 2 cm to about 3 cm.

5. The method according to Claim 4, including moving the sensor according to the vertices of a cube.

6. The method according to Claim 5, wherein the entire mapping volume comprises a plurality of cubes.

7. The method according to Claim 6, wherein each cube is defined by measurements at at least four different vertices.

8. The method according to Claim 7, wherein the sensor is moved by a robot.

9. The method according to Claim 8, wherein the mapping volume is approximately 20 cm X 20 cm X 20 cm or $(20\ cm)^3$.

10. The method according to Claim 1, including decreasing the value of the added distance component in step (i) through division by a factor of two ($X_i + dx/2$, $Y_i + dy/2$, $Z_i + dz/2$) .

11. A method for calibrating a medical system capable of generating a magnetic field for tracking a position of a medical device, the method comprising the steps of:

(a) defining a mapping volume within the generated magnetic field;

(b) placing a metallic object within the mapping volume;

(c) aligning a sensor at a first point within the mapping volume and measuring the magnetic field at the first point with the sensor to establish a first coordinate position (X_i, Y_i, Z_i);

(d) extrapolating the magnetic field of a next point ($X_i + dx$, $Y_i + dy$, $Z_i + dz$) along one coordinate axis by an added distance component (dx, dy, dz);

(e) calculating the coordinate position at the extrapolated next point based on the extrapolated magnetic field to establish an extrapolated coordinate position;

(f) determining the position difference between the extrapolated coordinate position and the actual coordinate position of the next point;

(g) comparing the position difference to an error limit;

(h) setting the added distance component (dx, dy, dz) according to a predetermined distance if the position difference is within the error limit, aligning the sensor at a new point within the mapping volume along another coordinate axis and measuring the magnetic field at the new point with the sensor to establish a new point coordinate position and repeating steps (d) – (g) along the other coordinate axis; and

(i) setting the added distance component (dx, dy, dz) by decreasing the value of the added distance component if the position difference is not within the error limit and establishing an intermediate point between the first point and the next point as the first position and repeating steps (d) – (g) along the same coordinate axis.

12. The method according to Claim 11, including completing the calibration method for the entire mapping volume.

13. The method according to Claim 12, wherein the error limit is $\leq$ 1 mm.

14. The method according to Claim 13, wherein the predetermined distance is a distance ranging from about 2 cm to about 3 cm.

15. The method according to Claim 13, wherein the predetermined distance is approximately 3 cm.

16. The method according to Claim 14, wherein the intermediate position is defined as $(X_i + dx/2, Y_i + dy/2, Z_i + dz/2)$

17. The method according to Claim 16, including moving the sensor according to the vertices of a cube.

18. The method according to Claim 17, wherein the entire mapping volume comprises a plurality of cubes.

19. The method according to Claim 18, wherein each cube is defined by measurements at at least four different vertices.

20. The method according to Claim 19, wherein the sensor is moved by a robot.

21. The method according to Claim 20, wherein the mapping volume is approximately 20 cm X 20 cm X 20 cm or $(20\ cm)^3$.